LEHIGH VALLEY SUMMERBRIDGE SUMMER 2010: WEEK 3, LESSON PLAN 10-ELEMENTS

Kristen Labert

I. OVERVIEW OF THE LESSON

A. July 6, 2010

B. 45 minutes

C. 7th and 8th grade chemistry

II. GENERAL OBJECTIVES

1. Students will be able explain what an element is.
2. Students will be able to analyze why the periodic table is important in the world.
3. Students will be able to know how to use the periodic table to gather information like atomic number, mass number, and symbol/name of element.

III. INSTRUCTIONAL MATERIALS

A. Computer

B. Mini PowerPoint (see attached sheet)

C. Smartboard

D. Periodic Table

E. Computer Paper

F. Construction Paper

G. Markers, crayons, colored pencils, etc.

IV. MOTIVATION AND INTRODUCTION (20 minutes)

A. Students will finish up their group periodic table projects.

V. DEVELOPMENT (25 minutes)

A. A mini lecture to the students. The teacher will discuss what an element is. It will be

explained that an element is a single pure substance of one type of atom. The

students will each be given their own periodic table. The teacher will go over the

various information that the periodic table gives, like the atomic number, mass

number, symbol, and name. It will be explained that the atomic number is the

number of protons in the nucleus and it is what separates one element from another.

The mass number is the mass of the element. The symbols and some names of

common elements will be discussed. Students will be told that they will need to

memorize the name and symbol of a certain elements. The teacher will explain that

the periodic table is the backbone of chemistry. It is important in the world and our

real lives because all the elements make up everything in our lives from our bodies to

the rest of the world around us. The teacher will bring up an interactive periodic table

to discuss these important concepts. Students will then label their own periodic table

with key information, like groups, periods, gases, solids, and etc.

B. Students will be assigned an element. They will make their own “element” trading

card. Students will include a picture, key information from the periodic table, like the

atomic number, mass number, symbol, and name. Students will be given an

information about their element like history and uses. With this they will formulate a

special skill or power for their trading card. The card will bear resemblance to a

pokemon card. Students will be shown the teachers card to show them what exactly to

do.

VI. SUMMARY AND CONCLUSION (5 minutes)

1. Students will reconvene. They will watch a sort video (2 min) discussing the elements from Discovery education. After watching it students will be asked what they thought about it. What more they learned? What they already knew. They will be reminded of their homework.

VII. HOMEWORK

1. Elements WS
2. Element trading card project

LEHIGH VALLEY SUMMERBRIDGE SUMMER 2010: WEEK 3, LESSON FOR WED.

Kristen Labert

I. OVERVIEW OF THE LESSON

A. July 7, 2010

B. 45 minutes

C. 7th and 8th grade chemistry

II. GENERAL OBJECTIVES

1. Students will be able explain the arrangement of the periodic table.
2. Students will be able to define the following terms: atomic mass, atomic number, the nucleus, proton, and neutron.
3. Students will be able to know how to use the periodic table to gather information like atomic number, mass number, and symbol/name of element.
4. Students will be able to analyze and devise a way to obtain the number of neutrons and electrons through knowing the atomic mass and atomic number.

III. INSTRUCTIONAL MATERIALS

A. Computer

B. Smartboard

D. Periodic Table

E. Paper

F. Writing Utensils

IV. MOTIVATION AND INTRODUCTION (10 minutes)

A. Students will present their periodic table groups to the class.

B. Students will be given a list of elements that they are to know the name and symbol.

V. DEVELOPMENT (25 minutes)

A. Students watched a 20 minute video called “The Elements” on Discovery Education. The video discussed basic atomic theory that elements are made of atoms, and atoms are made up of a nucleus which contains protons and neutrons and electrons in orbitals. The video discussed what the atomic number and atomic mass are, as well as it reviewed groups on the periodic table. During the video students will write down five facts they learned. At the end of the video, there is a video quiz to test comprehension. This will be done as a class.

B. Students will work on practice problems as a class to find the number of neutrons in an atom using the atomic mass and the atomic number of an element from the periodic table.

VI. SUMMARY AND CONCLUSION (10 minutes)

A. Students will solve some problems on the board themselves to see if the idea behind atomic mass and atomic number.

B. Students will get their homework. Homework logs will be written in and signed.

VII. HOMEWORK

1. WS
2. Crossword

LEHIGH VALLEY SUMMERBRIDGE SUMMER 2010: WEEK 3, LESSON FOR MEMORY: IT’S ELEMENTAL

Kristen Labert

I. OVERVIEW OF THE LESSON

A. July 8, 2010

B. 45 minutes

C. 7th and 8th grade chemistry

II. GENERAL OBJECTIVES

A. Students will be able exercise their memories.

B. Students will be able to practice the elements and their symbols

C. Students will be able to learn the names and symbols of important and common elements in the world.

D. Students will be able to create their own study aids for learning the elements.

III. INSTRUCTIONAL MATERIALS

1. Note cards
2. Chalkboard
3. Paper

IV. MOTIVATION AND INTRODUCTION (10 minutes)

A. Students will be asked to hand in their homework from the previous night. They will be asked if they have any questions.

B. There will be a warm-up problem on the board using atomic mass and atomic number to help students practice their skills learned yesterday.

V. DEVELOPMENT (30 minutes)

A. Students will be put into groups of three or four and play “Memory: It’s Elemental.” It will be a memory card game for to practice the forty-five elements. Students will have to match the element name with the symbol. This will allow students to practice and gain knowledge of common elements and symbols. The students who win in each of the games going on will get a prize from the prize box.

VI. SUMMARY AND CONCLUSION (5 minutes)

A. Homework will be explained and given to students. Students will be asked to fill out their homework logs.

VII. HOMEWORK

A. Students will be asked to pick five of the forty-five elements they are to learn and create their own fun ways to remember these elements and their symbols.

LEHIGH VALLEY SUMMERBRIDGE SUMMER 2010: WEEK 3, LESSON: JEOPARDY!

Kristen Labert

I. OVERVIEW OF THE LESSON

A. July 8, 2010

B. 45 minutes

C. 7th and 8th grade chemistry

II. GENERAL OBJECTIVES

A. Students will be able exercise their memories from information learned in the first three weeks of Summerbridge.

B. Students will be able to analyze what they know and what they don’t and what they need to study more.

III. INSTRUCTIONAL MATERIALS

1. Note cards
2. Chalkboard
3. Paper

IV. MOTIVATION AND INTRODUCTION (5 minutes)

A. Students will hear the jeopardy theme song when they come in.

B. Before the students start they will be asked to hand in their homework.

V. DEVELOPMENT (30 minutes)

A. Students will be put into two teams. They will play jeopardy to practice all the information learned in the previous three weeks at Summerbridge. The categories will be matter, mixtures, measurements, periodic table, chemical and physical changes, and the elements. Students will be able to see what they know or don’t know and what they need to review more.

VI. SUMMARY AND CONCLUSION (10 minutes)

A. Homework will be explained and given to students. Students will be asked to fill out their homework logs.

B. Students will fill out an “exit slip.” In this students will write what topic they feel like they most have to review.

VII. HOMEWORK

A. NONE

LEHIGH VALLEY SUMMERBRIDGE SUMMER 2010: WEEK 4, LESSON: IONS

Kristen Labert

I. OVERVIEW OF THE LESSON

A. July 12, 2010

B. 45 minutes

C. 7th and 8th grade chemistry

II. GENERAL OBJECTIVES

A. Students will be able to define what an ion is and that it can be positive or negative.

B. Students will be able to manipulate the definition of the ion to tell how many electrons are in an ion.

C. Students will be able to fully analyze the definition of the ion to know how many of each subatomic particle there is in the ion.

D. Students will be able to recognize common ions.

E. Students will be able to analyze the difference between ions and elements.

III. INSTRUCTIONAL MATERIALS

1. Periodic Table
2. Marbles
3. Paper

IV. MOTIVATION AND INTRODUCTION (5 minutes)

A. Students will see the notation for an ion on the chalk board. They will be asked what they think that means, what it is and what exactly it means or represents. I will explain to the students that it is what is called an ion. An ion can be positive or negative and it is when an electron is lost or gained.

V. DEVELOPMENT (30 minutes)

A. Students will be put into pairs. They will be given a sheet of common ions. With this sheet they will count out the electrons and protons in each ion. They will also use the periodic table in doing this. This will allow students to visualize an ion and what it actually means. They will do this for as many ions as they can until the class reconvenes. Students will be able to check their work to the teachers’ key, which will not be handed out until near the end of class.

VI. SUMMARY AND CONCLUSION (10 minutes)

A. Homework will be explained and given to students. Students will be asked to fill out their homework logs.

B. Students will fill out an “exit slip.” In this students will explain the definition of an ion in their own words. They will be asked to compare the difference between an element and an ion.

VII. HOMEWORK

A. Ion WS

LEHIGH VALLEY SUMMERBRIDGE SUMMER 2010: WEEK 4, LESSON: METALS, NON METALS, AND METALLOIDS

Kristen Labert

I. OVERVIEW OF THE LESSON

A. July 13, 2010

B. 45 minutes

C. 7th and 8th grade chemistry

II. GENERAL OBJECTIVES

A. Students will be able identify metals, non metals, and metalloids on the periodic table.

B. Students will be able to explain what a metal, non metal and metalloid is as well as their properties.

C. Students will be able to analyze the difference between metals, non metals, and metalloids as well as their properties.

D. Students will be able to identify real world examples of metals, non metals, and metalloids.

E. Students will be able to analyze how metals, non metals, and metalloids affect our lives.

III. INSTRUCTIONAL MATERIALS

1. PowerPoint
2. Smart board
3. Props

IV. MOTIVATION AND INTRODUCTION (20 minutes)

A. Students will watch a demo on turning pennies into brass. This will introduce students to metals and their properties. It will be mentioned to students that the elements in the periodic table can be broken into three categories.

B. Students will then see a brief PowerPoint containing information about metals, non metals, and metalloids. Students will see where these are located on the periodic table and students will label them (color code) on their periodic table that was given to them previously. Properties of non metals, metals, and metalloids will be presented as well, properties like ductility, malleability, and conductivity.

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V. DEVELOPMENT (20 minutes)

A. Students will be put in partners or a group of three and go around to five stations with items. At each station, students will need to identify what the everyday item is made of, is it a metal, non-metal, or metalloid? What type of properties does it have?

VI. SUMMARY AND CONCLUSION (5 minutes)

A. The students will reconvene and the teacher will go around asking the class what they got for each station. The conclusions will be made as to what the item was and what properties it possessed. Students will need to explain their ideas thoroughly and analyze completely why they think the substance was a metal, non metal, or metalloid.

VII. HOMEWORK

A. Metals, Non Metals, or Metalloid WS

LEHIGH VALLEY SUMMERBRIDGE SUMMER 2010: WEEK 4, LESSON: COMPOUNDS

Kristen Labert

I. OVERVIEW OF THE LESSON

A. July 14, 2010

B. 45 minutes

C. 7th and 8th grade chemistry

II. GENERAL OBJECTIVES

A. Students will be able explain what a compound is.

B. Students will be able to explain the difference between a compound and an element.

C. Students will be able name common compounds.

D. Students will be able to explain what different types of compounds are like ionic and organic compounds.

E. Students will be able to interpret directions and work collaboratively to learn how to name certain types of compounds.

III. INSTRUCTIONAL MATERIALS

1. Computer
2. Smartboard
3. Paper
4. Chalkboard

IV. MOTIVATION AND INTRODUCTION (10 minutes)

A. Students will see a chemical formula on the board, NaF. They will be asked what they think this means, what is it telling them about the elements. Students will write this down and then share with the class what they think. It will be told to them that this is a chemical compound and it will be explained what a compound is.

V. DEVELOPMENT (30 minutes)

A. Students will be placed into three groups. They will work together using a packet of information describing how to name certain types of compounds, ionic, ternary, binary, and molecular. Students will work together to figure out how to properly name such types of compounds based on the explanations and examples given. Students will then practice naming compounds at their station. The teacher will walk around and moderate the stations to make sure everything is clear and understood by the groups.

VI. SUMMARY AND CONCLUSION (5 minutes)

A. Students will be asked to complete an “exit” slip. Students will be asked to explain the difference between an element and a compound. This will let the teacher know if the concept of a compound was truly understood.

VII. HOMEWORK

A. Chemical Compounds WS

LEHIGH VALLEY SUMMERBRIDGE SUMMER 2010: WEEK 2, LESSON PLAN 12-BALANCING EQUATIONS

Kristen Labert

I. OVERVIEW OF THE LESSON

A. July 15, 2010

B. 45 minutes

C. 7th and 8th grade chemistry

II. GENERAL OBJECTIVES

1. Students will be able balance chemical equations.
2. Students will be able to explain what the law of conservation of mass is.
3. Students will be asked to think about and analyze why think it is important to have “balance” in the world.
4. Students will be able to act as real scientists and analyze compound data to come to a conclusion regarding how exactly to balance equations.

III. INSTRUCTIONAL MATERIALS

A. Worksheets

IV. MOTIVATION AND INTRODUCTION (10 minutes)

A. The introduction will then continue by showing students a scale. I will ask them what

they think about when they see a scale. I will put equal mass weights on each side of

the scale and ask students what this is demonstrating. I want them to see that I am

balancing the masses. I will then tell the students that today we will be discovering

the magic of conservation of mass in balancing equations. The law of conservation

of mass discusses how mass of reactants of a chemical equation is equal to mass of

the products in that equation. I will tell students that we will be discovering how to

balance equations demonstrating the law of conservation of mass and how the world

world also wants to remain in balance.

B. I will also show them a simple math equation and ask them what the equal sign is to them in math. I will show them a chemical equation and say that the arrow is an equal sign. In the chemistry world, just like the world around us, in math, in everywhere, there needs to be balance.

V. DEVELOPMENT (30 minutes)

A. I will be presenting students with data that will be breaking down the process of

balancing equations into three basic building blocks. I will start with presenting

students with data that will display common compounds and a list of the number of

atoms of each element making up that compound. The data will be varied in that it

will show different “variables” or instances. Like subscripts and coefficients. It will

be told to the students that a subscript is below the element and the coefficient is in

front of. It will be presented to the students what a subscript looks like and what a

coefficient looks like, however, students will need to construct from the data, what

exactly these two things do to a chemical compound. Students will work with one

another and with me directly. I will ask the students questions to start up

conversation like what do you see happening to the number of atoms of each

compound when there is a coefficient as opposed to the subscript. I want the students

to see the differences and to create for themselves an idea of what occurs. I will

monitor the formulation of this idea and make sure the discussion is progressing in

the right manner. The questions I will be asking for each data set will be the students’

opinion of what they are seeing occur. I will merely be guiding these answers to a

direction that will lead them to ideas that enable them to make their own. The

conclusions that I want students to get from this are that a coefficient affects the

number of atoms through multiplication, a subscript means there are the number of

atoms that the subscripts atoms state, and that a parenthesis combined with a subscript

means multiplication.

B. After this first set of data, the students will progress onto another set. This set

will present one side of an equation to the students. Students will be using the

information concluded from the previous data to assist them in this, but it will be

taking them one step further. The students will have the one side, two compounds, as

well as the total number of atoms of each element of this side ofthe equation. Students

will have to come up with conclusions with what one does to find out the total number

of atoms when given each side of the equation. I will ask them to use what they

previously learned and then to look at some familiar symbols and what that might

mean. Students will need to look at the data and formulate conclusions once again.

The conclusion I want students to make here are that one needs to find out the number

of atoms of each element in one compound and find the number in the other

compound and then add the number of like elements together.

C. Finally, we will move onto the final set of data, which will include unbalanced and

balanced equations that will include the numbers of atoms again. Students will be

asked to look at the unbalanced and balanced. I will ask them what are some

differences in the equations themselves and the number of atoms. I will ask what

these changes do and what conclusions can be made from them. I will ask the

students to compare the amount of atoms on each side of both the unbalanced and

balanced side of the equation and what they notice. I will remind them of the law of

conservation of mass and what this means should be done. The conclusion I want

students to make is that balancing equations is a puzzle. One needs to look at the

equation and ask themselves what can be done to have one side of an equation equal

one another.

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VI. SUMMARY AND CONCLUSION (5 minutes)

A. Students will be shown an unbalanced equation and be asked to utilize what

conclusions they have discovered from the various data presented to them and

balance some equations themselves applying these conclusions.

B. I will conclude by asking the students to always think of a scale. In order for the scale

to be balanced, one side has to be the same weight as the other, just like in equations,

the number of atoms on one side has to equal one another. I will remind them to think

of the world and that for every action there is an equal or opposite reaction. The

world has a balance to it, especially processes in nature.

VII. HOMEWORK

A. Balancing equation worksheet

**Data Sheets:**

**Data Set 1: Compounds and the Number of Atoms within them**

**Compound # of Each Atom of Each Element**

NaF 1 Na, 1 F

2NaBr 2 Na, 2 Br

AgCl2 1 Ag, 2 Cl

Ba(NO3)2 1 Ba, 2 N, 6 O

2Ca(NO3)2 2 Ca, 4 N, 12 O

3Cu3(PO4)2 9 Cu, 24 O, 2 P

2Al2(CrO4)3 4 Al, 6 Cr, 24 O

**Data Set 2: Half an Equation-The Total Number of Atoms on One Side of an**

**Equation**

**One Side of an Equation Total Number of each Atom of each Element**

NaCl + BaSO4 1 Na, 1 Cl, 1 Ba, 1 S, 4 O

2CaSO4 + AgNO3 2 Ca, 1 S, 1 Ag, 1 N, 11 O

2Al2(SO4)3 + NaNO3 4 Al, 6 S, 27 O, 1 Na, 1 N

**Data Set 3: Unbalanced and Balanced Reactions**

**Unbalanced Reaction 1:**

NaCl + Ba(NO3)2 → NaNO3 + BaCl2

**Number of Atoms of Each Element:**

**Left Side of Equation:** 1 Na, 1 Cl, 1 Ba, 2 N, 6 O

**Right Side of Equation:** 1 Na, 1 N, 3 O, 1 Ba, 2 Cl

**Balanced Reaction 1:**

2NaCl + Ba(NO3)2 → 2NaNO3 + BaCl2

**Number of Atoms of Each Element:**

**Left Side of Equation:** 2 Na, 2 Cl, 1 Ba, 2 N, 6 O

**Right Side of Equation:** 2 Na, 2 Cl, 1 Ba, 2 N, 6 O

**Unbalanced Reaction 2:**

Ca3(PO4)2 + Al2(SO4)3 → CaSO4 + AlPO4

**Number of Atoms of Each Element:**

**Left Side of Equation:** 3 Ca, 2 P, 20 O, 2 Al, 3 S

**Right Side of Equation:** 1 Ca, 1 S, 8 O, 1 Al, 1 P

**Balanced Reaction 2:**

Ca3(PO4)2 + Al2(SO4)3 → 3CaSO4 + 2AlPO4

**Number of Atoms of Each Element:**

**Left Side of Equation:** 3 Ca, 2 P, 20 O, 2 Al, 3 S

**Right Side of Equation:** 3 Ca, 3 S, 20 O, 2 Al, 2 P

**Let’s Try Some Balancing! Get out your scales!**

CH4 + O2 → CO2 + H2O

NaNO3 + CaCl2 → NaCl + Ca(NO3)2

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_

**Homework**

**Balance these equations:**

O2 + NO → NO2

Mg + O2 → MgO

HCl + NaOH → H2O + NaCl

HC2H3O2 + Ba(OH)2  → H2O + Ba(C2H3O2)2

Writing Chemical Formulas

A **chemical formula** is a combination of elemental symbols and subscript (examples: x2, y3) numbers that is used to show what a compound is made of. Depending of the type of compound that the formula represents, the information that is given will sometimes be different.  Before we go about learning how to write chemical formulas, it is important that you clearly understand the difference between **molecular compounds** and **ionic compounds**.

**Ionic compounds** are made of charged ions that are held together by electrostatic forces.  A typical type of ionic compound, called a **binary compound** because it is made up of **two elements**, is made of metallic positive ions (**cations**) and nonmetal negative ions (**anions**).   Another type of ionic compound, called a **ternary compound** because it has **three elements**, is composed of monatomic ions (one ion) and polyatomic ions (multiple ions).  When dealing with ionic formulas it is very important to remember that the formula does not show how the compound actually exists in nature.  It only shows the ratio of how ions combine.  For example, the ionic formula for calcium chloride is CaCl2. Since calcium chloride is an ionic compound, this formula does not mean that there are actually two chlorine atoms floating around attached to one calcium atom.  The formula shows that a sample of calcium chloride contains twice as many chlorine atoms as calcium atoms.  Remember that **ionic compounds are not molecules**, so the formula CaCl2 is said to represent one **formula unit** of calcium chloride.

**Molecular compounds** are held together by bonds, called covalent bonds, meaning the compounds share electrons.  Molecular formulas do show these molecules as they actually exist.  When we say that the molecular formula of water is H2O, we can see that the molecules of water are made up of three atoms, two hydrogen atoms are covalently bonded to each oxygen atom.  A special type of chemical formula, called an **empirical formula**, shows the composition of a molecule not as it exists, but in a simple whole number ratio.   The differences will be explored later.

     Today will concentrate on writing simple chemical formulas when given a formula name.  In learning how to write chemical formulas, you will use the ions we learned about the other day.

**Writing Ionic Formulas**

**I**. **Binary Compounds** - Binary compounds are compounds that are made of only two elements.  When you write the formulas for binary compounds, they will consist of have two elemental symbols, and they may also have one or two subscript numbers, if the elements don't combine in a one to one ratio.  You are probably familiar with the formula NaCl for table salt.  This formula shows no subscripts because one ion of Na will be present for each ion of Cl, in any sample of table salt.

You will be given the name of a binary compound and you will be expected to be able to write the proper formula for the compound.  There will be two sources of information for writing the correct formula.  The compounds name will give you the elements that make up the compound.  The charges of the ions involved will show you the ratio by which they combine.  Let's go through an example;

**Example 1.  Write the correct formula for Barium Fluoride.**

Step one - Write the symbols for the elements in the compound.  If you need to review the elemental symbols, see your periodic table.  Note that the ending "ide" is used for fluoride to show that it is a negative ion of fluorine.

**Barium = Ba              Fluoride = F**

Step two - Look up the charges of the elements involved (see ion table), and write them as superscripts to the right of the elemental symbols.  Note that when no number is with a charge symbol, as in the case of fluoride below, they charge value is understood to be "1".

**Barium = Ba2+             Fluoride = F-**

Step three - Use the correct combination of ions to produce a compound with a net charge of zero.  In this case, (2+) + 2(-1) = 0.  So, two fluoride ions will cancel out one barium ion.   Since it would take two fluoride ions (each with a charge of negative one) to cancel out one barium ion (with a charge of plus two) we use a subscript of two after the symbol for fluorine to show the ratio.

**BaF2**

If this seems confusing to you, it will get simpler over time.

Example 2.  Write the proper formula for the ionic compound lithium bromide.

Step one - Write the symbols for the elements in the compound.  Note that the ending "ide" is used for bromide to show that it is a negative ion of bromine.

**Lithium = Li         Bromide = Br**

Step two - Look up the charges of the elements involved (see ion table), and write them as superscripts to the right of the elemental symbols.  Note that when no number is with a charge symbol, as in the case of fluoride below, the charge value is understood to be "1".

**Lithium = Li+         Bromide = Br-**

Step three - Use the correct combination of ions to produce a compound with a net charge of zero.  In this case, (+1) + (-1) = 0. So, one lithium ion will cancel out the charge of one bromide ion.   This means that the two elements will combine in a one to one ratio, and know subscripts will be needed.

**LiBr**

**Try these on a blank piece of paper:**

Potassium bromide

Barium chloride

Lithium iodide

**II. Ternary Compounds** - Ternary compounds are composed of three different elements.  The most common types of ternary compounds have a metallic cation (positive ion) and a polyatomic anion (negative ion).   The only common polyatomic ion with a positive charge is the ammonium ion.  You will want to write these formulas using your ion table.

Example 1.  Write the proper chemical formula for potassium hydroxide.

Step one - Write the symbols for the monatomic and polyatomic ions in the compound.  You will find the symbol potassium and hydroxide on your ion sheet.

**Potassium = K      Hydroxide = OH**

Step two - Look up the charges of the ions involved (in table 5-2b and 5-2d, or some similar tables), and write them as superscripts to the right of the elemental symbols.

**Potassium = K+     Hydroxide = OH-**

Step three - Use the correct combination of ions to produce a compound with a net charge of zero. Parenthesis must be used if you need more than one of a polyatomic ion.  In this case, (+1) + (-1) = 0.  So, only one of each ion is used.  No subscripts are necessary.  If you needed more than one hydroxide ion, it would be put in parenthesis with the subscript on the outside.

**KOH**

Note the importance of upper and lower case

Example 2.  Show the correct formula for Calcium Nitrate.

Step one - Write the symbols for the monatomic and polyatomic ions in the compound.

**Calcium = Ca       Nitrate = NO3**

Step two - Look up the charges of the ions involved (in table 5-2b and 5-2d, or some similar tables), and write them as superscripts to the right of the elemental symbols.

**Calcium = Ca2+       Nitrate = NO3-**

Step three - Use the correct combination of ions to produce a compound with a net charge of zero. **Parenthesis must be used if you need more than one of a polyatomic ion.** In this case (+2) + 2(-1) = 0.   We need to show two nitrate ions in our formula.  The subscript is put on the outside of the parenthesis to show that the entire polyatomic ion is doubled.

**Ca(NO3)2**

The correct use of parenthesis will seem hard at first, but you must master this skill with practice!

**Try these on a blank piece of paper:**

Barium hydroxide

Potassium nitrate

Sodium acetate

**III. The Stock System** - Some elements, like iron and lead, have more than one charge.  If you were given a compound name like lead chloride, you would not know if you should used an oxidation number of +2 or +4 for the lead.  The stock system is used to specify which form of an element, that shows multiple charges, is used in a particular compound.   A roman numeral is shown after the name of the positive ion (cation) to indicate the charge of the positive ion.

Example 1.  Show the correct formula for lead(IV) nitrate.

Step one - Write the symbols for the  ions in the compound.

**Lead = Pb           Nitrate = NO3**

Step two - Look up the charge of the negative ion involved (in ion table).  The positive ion will have a positive charge number equal to the Roman numeral.  Write the numbers as superscripts to the right of the elemental symbols.

**Lead = Pb4+          Nitrate = NO3-**

Step three - Use the correct combination of ions to produce a compound with a net charge of zero. **Parenthesis must be used if you need more than one of a polyatomic ion.**

**Pb(NO3)4**

Example 2.  Show the correct formula for Copper(II) Fluoride

Step one - Write the symbols for the  ions in the compound.

**Copper = Cu       Fluoride = F**

Step two - Look up the charge of the negative ion involved (in ion table).  The positive ion will have a positive oxidation number equal to the roman numeral.  Write the numbers as superscripts to the right of the elemental symbols.

**Copper = Cu2+       Fluoride = F-**

Step three - Use the correct combination of ions to produce a compound with a net charge of zero. Parenthesis must be used if you need more than one of a polyatomic ion.

**CuF2**

**Try these on a blank piece of paper:**

Copper (III) chloride

Tin (IV) nitride

Copper (I) nitrate

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_

Please give the correct chemical formula or name.

1. NaCl
2. NaNO3
3. BaSO4
4. NaOH
5. Cu(C2H3O2)2
6. Potassium cyanide
7. Cesium chloride
8. Magnesium sulfate
9. Sulfur dioxide
10. Beryllium sulfide

LEHIGH VALLEY SUMMERBRIDGE SUMMER 2010: WEEK 4, LESSON CHEMICAL REACTIONS

Kristen Labert

I. OVERVIEW OF THE LESSON

A. July 16, 2010

B. 45 minutes

C. 7th and 8th grade chemistry

II. GENERAL OBJECTIVES

1. Students will be able explain what a chemical reaction is.
2. Students will be able to explain that chemical reactions occur in everyday life.

III. INSTRUCTIONAL MATERIALS

A. Computer

B. Mini PowerPoint (see attached sheet)

C. Smartboard

D. Periodic Table

E. Computer Paper

F. Construction Paper

G. Markers, crayons, colored pencils, etc.

IV. MOTIVATION AND INTRODUCTION (5 minutes)

A. Students will watch a short clip about chemical reactions from Discovery education (Chemical Reactions and Energy Changes), to introduce them to this concept before thoroughly discussing it.

V. DEVELOPMENT (35 minutes)

A. After watching the video, students will be asked what they think a chemical reaction is. The teacher will explain that a chemical reaction is the transformation of one chemical substance into another. The teacher will give the students some real life examples like cooking, when one mixes all the ingredients together and bakes a cake; they are making a chemical reaction. One is taking ingredients and forming a cake. Another example is your car. The car uses fuel to go and it does this through a combustion reaction. The teacher will ask the students to think of some of their own examples.

B. Students will be shown various demonstrations in regards to what a chemical reaction is and see that there are many ways a chemical reaction can occur. The demonstrations that will be done are burning magnesium ribbon, forming a precipitate, a replacement reaction, sodium with water, an endothermic reaction, floating pennies, ionic reactions, and Aladdin’s lamp. A full out description of the experiments can be found at <http://intro.chem.okstate.edu/ChemSource/Chemrx/chemrx8.htm>. During each demonstration, the teacher will discuss what is occurring in the reaction and why. Students will need to fill out a worksheet while doing this describing what occurs and why a chemical reaction occurs.

VI. SUMMARY AND CONCLUSION (5 minutes)

A. Students will write an “exit slip” and write down a chemical reaction they see in everyday life that has not been mentioned in class that day. This will help them think about the world around them.

VII. HOMEWORK

A. NONE

LET’S PRACTICE!

With the following ions, use marbles to count out the number of protons, neutrons, and electrons based on the charge, as well as data from the periodic table. Towards the end of class, a key will be handed out to check answers.

Cs1+

Mg2+

Cu2+

Bi3+

Sb5+

Br1-

O2-

Se2-

N3-

C4-

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_

ION HOMEWORK

Write down the number of protons, neutrons, and electrons of the following ions using what you know about ions and the periodic table.

1) Ti4+

Protons=

Neutrons=

Electrons=

2) Co3+

Protons=

Neutrons=

Electrons=

3) Co2+

Protons=

Neutrons=

Electrons=

4) Cd2+

Protons=

Neutrons=

Electrons=

5) Tl1+

Protons=

Neutrons=

Electrons=

6) Cl1-

Protons=

Neutrons=

Electrons=

7) H1-

Protons=

Neutrons=

Electrons=

8) S2-

Protons=

Neutrons=

Electrons=

9) P3-

Protons=

Neutrons=

Electrons=

10) Si4-

Protons=

Neutrons=

Electrons=

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_

Metals, Non metals, and Metalloids

Think of everyday items and how they could relate to metals, non metals, and metalloids. Think of five items and describe in **2-4 sentences** if they are a non metal, metal, or metalloid and why they fit this category. Also, describe some characteristics or properties the item may have which are special to metals, non metals and metalloids. If you do not fully answer the questions and do so in less than 2-4 sentences you WILL get YO.

1)

2)

3)

4)

5)